

## Health Care Personnel and Influenza Vaccine

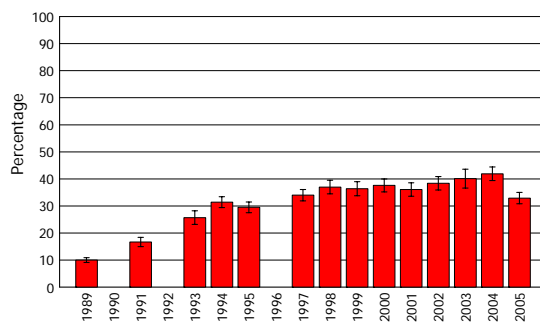
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Conferences, 2007  
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## Current ACIP Recommendations

- **"All health care personnel (HCP), as well as those in training for health-care professions, should be vaccinated annually against influenza. Persons working in health-care settings who should be vaccinated include physicians, nurses, and other workers in both hospital and outpatient-care settings, medical emergency-response workers (e.g., paramedics and emergency medical technicians), employees of nursing home and chronic-care facilities who have contact with patients or residents, and students in these professions who will have contact with patients."**

Prevention and Control of Influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2007  
MMWR June 29, 2007 / 56 (Early Release): 1-54

Self-Reported Influenza Vaccination Coverage Trends 1989-2005  
United States, National Health Interview Survey (NHIS)



<http://www.cdc.gov/flu/professionals/vaccination/pdf/vaccinetrend.pdf>

## Reasons (Excuses?) for HCP Non-Compliance

- Perception that vaccine is ineffective<sup>1,2</sup>
- Perception that vaccine is unnecessary<sup>1,2</sup>
- Dislike of injections
- Belief that vaccine causes the flu<sup>2</sup>
- Inconvenience<sup>1</sup>

<sup>1</sup>Takayanagi et al. Attitudes of health care workers to influenza vaccination: why are they not vaccinated? Am J Infect Control 2007; 35: 56-61  
<sup>2</sup>WillisBC, Wortley P. Nurses' attitudes and beliefs about influenza and the influenza vaccine: A summary of focus groups in Alabama and Michigan. Am J Infect Control 2007; 35: 20-24

## Reasons for HCP Compliance

- Self-protection<sup>1</sup>
- Protect the patient<sup>1,2</sup>
- Better to have the vaccine than influenza<sup>1</sup>
- Recommendation by supervisor<sup>1</sup>
- Avoid missing work<sup>1</sup>
- Belief that the vaccine does not cause influenza<sup>1</sup>
- Recommended by physician<sup>1</sup>
- Received written request for compliance<sup>1</sup>
- Have cared for patients with severe influenza<sup>1</sup>

<sup>1</sup>Takayanagi et al. Attitudes of health care workers to influenza vaccination: why are they not vaccinated? Am J Infect Control 2007; 35: 56-61  
<sup>2</sup>WillisBC, Wortley P. Nurses' attitudes and beliefs about influenza and the influenza vaccine: A summary of focus groups in Alabama and Michigan. Am J Infect Control 2007; 35: 20-24

I Was Vaccinated Last Year



The Vaccine is Unnecessary

\*Note: Presentation may not include all slides listed and the order may be changed.

## “Sloppy, Capricious, Promiscuous”

- No “proof-reading” mechanism during replication
  - Allows small errors to accumulate
  - “Drift”
- Segmented genome
  - Allows swapping of gene segments during co-infection
  - “Shift”

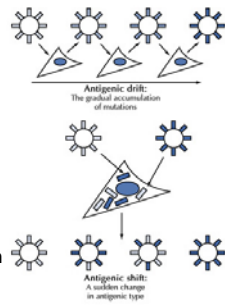


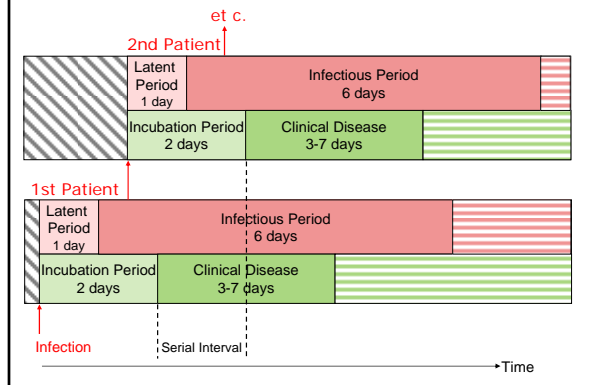
Figure: Principles of Molecular Biology, 3<sup>rd</sup> Edition <http://servet.uab.es/avillaverde/Caan/data/index.htm> © Academic Press, 2000.

## Transmission I

- Large respiratory droplets
- Direct contact transfer of virus from contaminated hands to the nose or eyes
- Exposure to small-particle aerosols in the immediate vicinity of the infectious individual
  - Suggested by some observational studies
- NO convincing evidence for airborne transmission over large distances



## Transmission II



## Evidence

- Sartor C et al. Disruption of services in an internal medicine unit due to a nosocomial influenza outbreak. *Infect Control Hosp Epidemiol* 2002; 23: 615-619
- Malvaud S et al. Nosocomial outbreak of influenza virus A (H3N2) infection in a solid organ transplant department. *Clinical Transplantation* 2001; 72(3): 535-537
- Carman W et al. Effects of influenza vaccination of health-care workers on mortality of elderly people in long-term care: a randomised controlled trial. *Lancet* 2000; 355: 93-97
- Slinger R and Dennis P. Nosocomial influenza at a Canadian pediatric hospital from 1995 to 1999: opportunities for prevention. *Infect Control Hosp Epidemiol* 2002; 23: 627-629
- Horcajada JP et al. A nosocomial outbreak of influenza during a period without influenza epidemic activity. *Eur Respir J* 2003; 21: 303-307
- Munoz F et al. Influenza A virus outbreak in a neonatal intensive care unit. *Pediatr Infect Dis J* (1999); 18(9): 811-5
- Cunney R et al. An outbreak of influenza A in a neonatal intensive care unit. *Infect Control Hosp Epidemiol* (2000); 21 (7): 449-54

I Don't Want to Miss Work

I Want to Protect my Patients

I Want to Protect Myself



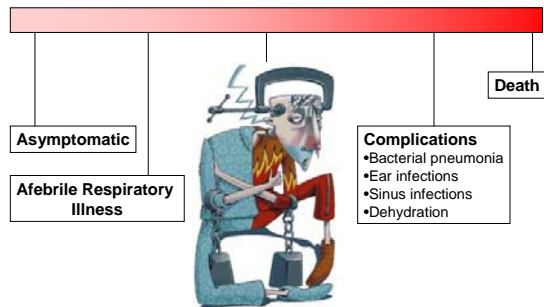
I Don't Get the Flu

I Never Get Sick



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## Spectrum of Signs and Symptoms



<http://www.cdc.gov/flu/keyfacts.htm>

## Asymptomatic and Pre-Symptomatic Infection

### Asymptomatic

- Foy, et al. Influenza B in households: virus shedding without symptoms or antibody response. *Am J Epidemiol* 1987; 126:506-15
- Couch, et al. Correlated studies of a recombinant influenza-virus vaccine. 3. Protection against experimental influenza in man. *JID* 1971; 124: 473-80
- Khakpour, et al. Proved viraemia in Asian influenza (Hong Kong variant) during incubation period. *BMJ* 1969; 4: 208-209
- Philip, et al. Epidemiologic studies on influenza in familial and general population groups, 1951-1956
- Monto, et al. Tecumseh study of illness. XIII. Influenza infection and disease, 1976-1981. *Am J Epidemiol* 1985; 121: 811-22

### Pre-Symptomatic

- Frank, et al. Patterns of shedding of myxoviruses and paramyxoviruses I children. *JID* 1981; 144: 433-41
- Davis, et al. Epidemiologic studies on influenza in familial and general population groups, 1951-1956. III. Laboratory observations. *Am J Hyg.* 1961; 73: 138-47
- Khakpour, et al. Proved viraemia in Asian influenza (Hong Kong variant) during incubation period. *BMJ* 1969; 4: 208-209

## Incidence and Recall of Influenza

- 23% of unvaccinated health care personnel had serological evidence of influenza infection during a mild season
  - 59% did not recall having influenza
  - 28% did not recall having *any* respiratory infection
- High rate of self-misdiagnosis among HCP

Elder AG, O'Donnell B, McCruden EAB, Symington IS, Carman WF. Incidence and recall of influenza in a cohort of Glasgow healthcare workers during the 1993-1994 epidemic: results of serum testing and questionnaire. *BMJ* (1996); 313: 1241-2



I Have Cared for Patients with Severe Influenza

## The Vaccine Doesn't Work



## Vaccine Efficacy & Effectiveness

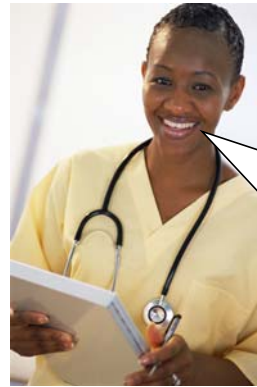
- Vaccine efficacy & effectiveness depends on:
  - Age of vaccine recipient
  - Immunocompetence of vaccine recipient
  - Degree of similarity between the viruses in the vaccine and those in circulation
  - The outcome being measured

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## Adults Up To 65 Years of Age

- Healthy adults, match between vaccine and circulating strains
  - TIV prevents lab-confirmed influenza illness among ~70%--90%
  - Decreased work absenteeism and use of health-care resources
- Healthy adults, mis-match between vaccine and circulating strains
  - Efficacy against laboratory-confirmed influenza illness was 50%--77%
  - Protection against influenza-related hospitalization was 90%
- Adults at risk for influenza complications
  - In a mis-match season, effectiveness for prevention of lab-confirmed influenza was 48%, effectiveness against hospitalization among adults aged 50--64 yrs with high-risk conditions was 36%
  - A case-control study showed vaccination reduced deaths attributable to any cause 78% and reduced hospitalizations due to respiratory infections or cardiopulmonary diseases 87%
  - In diabetic patients, vaccination was associated with a 56% reduction in any complication, a 54 % reduction in hospitalizations, and a 58% reduction in deaths
  - Vaccinated pregnant women have protective concentrations of anti-influenza antibodies
  - Passive transfer of anti-influenza antibodies that might provide protection from vaccinated women to neonates has been reported

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The Best Way to Prevent Influenza is by Getting Flu Vaccine Every Year

The Flu Shot Will Give Me the Flu



The Flu Shot Will Make Me Sick

## Influenza Vaccine Viruses



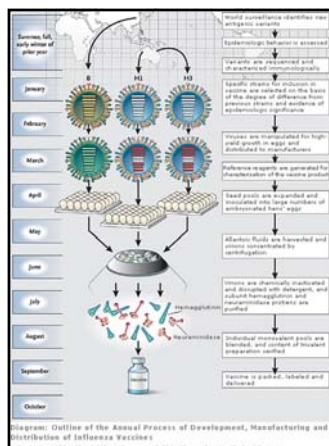
Split virus  
aka "subvirion"



Subunit  
(surface antigen)

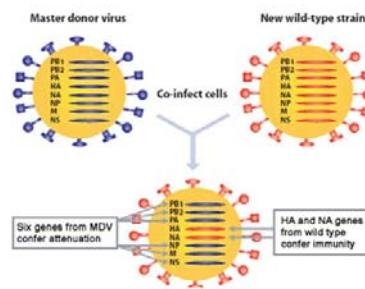


Live attenuated



## Trivalent Inactivated (Killed) Influenza Vaccine

## Live Attenuated Influenza Vaccine



This virus can grow in the nose and throat, but not in the lower respiratory tract where the temperature is higher

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## Vaccine Side Effects

### TIV

- Soreness, redness, or swelling where the shot was given (most common side effect)
- Fever (low grade)
- Aches
- If these problems occur, they begin soon after the shot and usually last 1 to 2 days

### LAIV

- Runny nose
- Headache
- Sore throat (adults)
- Cough (adults)
- Vomiting (children)
- Muscle aches (children)
- Fever (children)

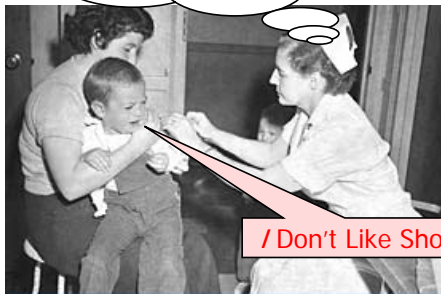
- Almost all people who receive flu vaccine have no serious problems from it
- On rare occasions, flu vaccination can cause serious problems, such as severe allergic reactions

## The Flu Vaccine Can't Give you Flu



It's Better to Have the Vaccine than Flu

I Don't Like Shots



## LAIV for Health Care Professionals

- LAIV can be given to healthy, non-pregnant persons aged 2-49 yrs, including HCP and close contacts of high-risk persons
  - Give TIV to HCP caring for severely immunosuppressed persons (e.g., patients with hematopoietic stem cell transplants) who require a protective environment (typically defined as a specialized patient-care area with a positive airflow relative to the corridor, high-efficiency particulate air filtration, and frequent air changes)
- No preference is indicated for LAIV or TIV when considering vaccination of healthy, non-pregnant persons aged 2--49 years.



## Convenience

- 31% of physicians and nurses surveyed did not receive influenza vaccine because it was inconvenient
- See your Flu Fighter Toolkit for ways to make vaccination convenient

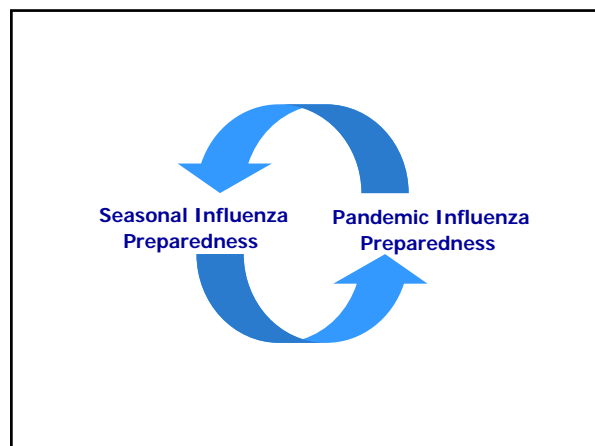
Weingarten S, et al. Barriers to influenza vaccine acceptance: a survey of physicians and nurses. Am J Infect Control (1989); 17: 202-207.

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It was Recommended by my Doctor

It was Recommended by my Supervisor

I Received a Written Request for Compliance

### HHS Pandemic Influenza Plan

Table D-1: Vaccine Priority Group Recommendations\*

Tier	Subtier	Population	Rationale
1	A	<ul style="list-style-type: none"> <li>Vaccine and antiviral manufacturers and others essential to manufacturing and critical support (~40,000)</li> <li>Medical workers and public health workers<sup>3</sup> who are involved in direct patient contact, other support services essential for direct patient care, and vaccinators (8-9 million)</li> </ul>	<ul style="list-style-type: none"> <li>Need to assure maximum production of vaccine and antiviral drugs</li> <li>Healthcare workers are required for quality medical care (studies show outcome is associated with staff-to-patient ratios). There is little surge capacity among healthcare sector personnel to meet increased demand.</li> </ul>

Thank You!

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